and Melbourne, coincides with the evening maximum of the barometer. A similar coincident minimum, even more strongly marked, characterises the diurnal variation of the rainfall at Calcutta and Batavia in their respective rainy seasons. In the author's opinion these facts seem to point to a compression and dynamic heating of the cloud-forming strata, and he points to the existence of a small irregularity in the diurnal temperature curves of Prague, Calcutta, and Batavia, which may possibly be due to such action. It is further remarked that the evening maximum about coincides with the time when the evening fall of temperature, after a rapid reduction between 6 or 7 and 10 P.M., becomes nearly uniform in rate, and it is suggested that the former may possibly be determined by the check of the rate of collapse of the cooling atmosphere. But it is observed that both the morning and evening waves of pressure probably involve other elements than the forced waves, and are in part rhythmic repetitions of previous waves.

III. "Effect of Chlorine on the Electromotive Force of a Voltaic Couple." By G. GORE, F.R.S. Received April 7, 1888.

If the electromotive force of a small voltaic couple of unamalgamated magnesium and platinum in distilled water, is balanced through the coil of a moderately sensitive galvanometer of about 100 ohms resistance, by means of that of a small Daniell's cell plus that of a sufficient number of couples of iron and German silver of a suitable thermoelectric pile (see 'Proceedings of the Birmingham Philosophical Society,' vol. 4, p. 130), the degree of potential being noted; and sufficiently minute quantities of very dilute chlorine-water are then added in succession to the distilled water, the degree of electromotive force of the couple is not affected until a certain definite proportion of chlorine has been added; the potential then suddenly commences to increase, and continues to do so with each further addition within a certain limit. Instead of making the experiment by adding chlorine-water, it may be made by gradually diluting a very weak aqueous solution of chlorine.

The minimum proportion of chlorine necessary to cause this sudden change of electromotive force is extremely small; in my experiments it has been 1 part in 17,000 million parts of water,* or less than a 7000th part of that required to yield a barely perceptible opacity in ten times the bulk of a solution of sal-ammoniac by means of nitrate of silver. The quantity of liquid necessary for acting upon the couple

* As 1 part of chlorine in 17,612 million parts of water had no visible effect, and 1 in 17,000 millions had a distinct effect, the influence of the difference, or of 1 part in 500,000 millions, has been detected.

is small, and it would be easy to detect the effect of the above proportion, or of less than one ten-thousand-millionth of a grain of chlorine in one-tenth of a cubic centimetre of distilled water by this process. The same kind of action occurs with other electrolytes, but requires larger proportions of dissolved substance.

As the degree of sensitiveness of the method appears extreme, I add the following remarks:—The original solution of washed chlorine in distilled water was prepared in a dark place by the usual method from hydrochloric acid and manganic oxide, and was kept in an opaque, well-stoppered bottle in the dark. The strength of this liquid was found by means of volumetric analysis with a standard solution of argentic nitrate in the usual manner, the accuracy of the silver solution being proved by means of a known weight of pure chloride of sodium. The chlorine liquid contained 2·3 milligrammes, or 0·03565 grain of chlorine per cubic centimetre, and was just about three-fourths saturated.

One-tenth of a cubic centimetre of this solution ("No. 1"), or 0·003565 grain of chlorine was added to 9·9 c.c. of distilled water and mixed. One cubic centimetre of this second liquid ("No. 2"), or 0·0003565 grain of chlorine was added to 99 c.c. of water and mixed; the resulting liquid ("No. 3") contained 0·000003565 grain of chlorine per cubic centimetre. To make the solution ("No. 4") for exciting the voltaic couple, successive portions of one-tenth or one-twentieth cubic centimetre of "No. 3" liquid were added to 900 c.c. of distilled water and mixed.

I have employed the foregoing method for examining the states and degrees of combination of substances dissolved in electrolytes, and am also investigating its various relations.

IV. "Electro-chemical Effects on Magnetising Iron. Part II."* By Thomas Andrews, F.R.S.E., F.C.S. Communicated by Professor G. G. Stokes, P.R.S. Received April 9, 1888.

The novel electro-chemical effects observed between a magnetised and an unmagnetised bar when in circuit in certain solutions, recorded in the first part of this research, were of such an interesting character that I thought it desirable to extend the investigation. The present memoir contains the results of a further study of these magneto-chemical phenomena, which were found to be more marked and characteristic when experimenting with some of the reagents herein described. The method of experimentation was generally similar to that pursued and described in Part I, though it was necessary to

* For first part see vol. 42, p. 459.